Original Article

Knowledge about Vitamin D among General Population in Baghdad City

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Abstract

Background

Globally and in Iraq, vitamin D insufficiency is becoming more of a problem. Knowledge is crucial in preventing deficiency and future consequences. The current study intends to investigate the general population's knowledge about vitamin D in Baghdad, Iraq.

Methods

A cross-sectional online study including 1,011 residents of Baghdad, Iraq, was carried out. To choose participants, a non-probability convenience sampling method was applied. Knowledge questionnaires with 17 items were taken from earlier research. Fisher exact and Chi-Square were utilized to identify associations between the variables.

Results

The overall prevalence of good knowledge among participants was 74.3%. About 48.8% did blood tests before to check vitamin D levels. Around half of respondents (47.1%) did take vitamin D supplements before. The level of good knowledge among respondents was 74.3%. Multivariable logistic regression model showed that respondents taking vitamin d supplements had better knowledge (AOR; 2.241, 95 CI: 1.701-3.444).

Conclusion

People living in Baghdad have a good knowledge level about Vitamin D but more health education and promotion are needed to address specific issues like dietary sources and, the best season to get vitamin D as the majority did not know it.

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Keywords: Knowledge, Vitamin D, Baghdad city

Introduction

Globally, vitamin D insufficiency is becoming more of a public health problem.[1] The Middle East and North Africa region has the greatest rates of vitamin D insufficiency. [1,2] In a study done in 2019 among Iraqi women of reproductive age in,[3] the average serum vitamin D level was 15.85± 7.69 ng/ml , and 76% of the sample had insufficient levels of vitamin D. and the percentage of insufficiency was 18%, while just 7% of them had adequate levels of serum vitamin D. Another study in northern Iraq with 10,823 participants discovered that a significant portion (almost 78%) who were sent to both clinical laboratories situated in Erbil city had vitamin D insufficiency levels.[4]

Due to the practically continual high temperatures in this sunny subtropical region, individuals in the Middle East, especially those in Iraq, often avoid being in the sun while the sun is the primary source of vitamin D.[5] The main sources of vitamin D are food consumption, UV-B rays from the sun, and vitamin D dietary supplements. But naturally foods high in vitamin D are rare, and include oily fish, cod liver oil, and egg yolks.[6,7]

According to previous studies, the significant prevalence of vitamin D (VD)deficiency among Saudi individuals with prior illnesses was caused by low levels of VD knowledge and low supplement intake.[8,9] According to a recent study from the UAE, adult Emiratis had higher overall VD knowledge but lower or medium levels of knowledge and awareness of VD supplements.[10] Similar findings were found in a web-based Jordanian study about university students' knowledge and practices addressing VD.[11] Female office employees in Malaysia were shown to have a good understanding of VD (45%), but a moderate attitude and level of practice (76%) and 84%, respectively, toward sun exposure and dietary VD consumption. [12] A study among university students in Malaysia found that 69% of students had good knowledge and correctly identified sun exposure as the main source of vitamin D.[13] This study investigated the general population's knowledge about vitamin D in Baghdad, Iraq.

Methods

Study design and setting

An internet-based cross-sectional study was conducted among 1,011 people living in Baghdad City, Iraq.

Study population and sampling

Adult people aged 18 years old and above and living in Baghdad city participated in the study. Non-probability Convenience sampling method was used to recruit participants in the study.

Data collection

The questionnaires were distributed through invitation links via Facebook and WhatsApp groups. Gmail form was used to host the questionnaires and participants needed to read the full description of the study and click on (agree to participate) before they were redirected to the questionnaires. Non-probability convenience sampling method was used to select participants.

The questionnaire consisted of two parts, mainly part one regarding socio-demographic characteristics of the respondents and previous medical history, vitamin D checking history, and supplements history. Part two regarded vitamin D knowledge and consisted of 17 questions (the main source of vitamin D, dietary sources of vitamin D, factors affecting vitamin D absorption, benefits of vitamin D, the lowest acceptable level, and best season to get vitamin D). One point was given for a correct answer, while an incorrect answer obtained zero points. A participant's cumulative score was 17 points if they answered all questions correctly. Respondents answering more than 50% of questions correctly were considered to have good knowledge about vitamin D. The knowledge questionnaires were adopted from previous studies.[14,15]

A pre-test was done to make sure that all questions were easy to read and understandable by participants. A back-to-back translation was done for the original questionnaires form English to Arabic language by 2 language experts.

Data analysis

Using SPSS version 26, data analysis was carried out. Descriptive statistics were calculated for frequency, percentage, mean, and SD. Association between sociodemographic characteristics and knowledge of vitamin D were tested using Fisher exact and Chi-Square. Binary logistic regression analysis was performed to determine main factors independently associated with good knowledge among respondents. All variables with P value <0.2 were included in multivariable analysis to control for confounders.

Ethical Consideration

Before the study began, ethical approval (CON-HE-005) was received from the College of Nursing's ethics committee at Al-Bayan University, Baghdad. Before moving on to part A of the questionnaires, all the participants read the introduction about the study and clicked the accept button if they wished to engage in the research.

Results

Socio-demographic characteristics of the respondents

Two-thirds of the participants were females (59%), 71% were married, 67% with a university degree, and around 51% of the respondents were not working. The mean age of the respondents was 26.64± 9.89 years. Those suffering from chronic diseases comprised 21%, and 48.8% did blood tests before to checking vitamin D levels. Nearly half of the respondents (47.1%) did take vitamin D supplements before. Respondents who answered about their vitamin D levels were 468, and the mean level was 19.45±11.92 ng/mL

Source of Information for respondents

Figure 1 represents sources of information about Vitamin D among respondents, The main source was the internet (37.0%) followed by doctors and primary health care centres (24.0%), universities (20.0%), friends or family members (12.0%) and TV (7%).

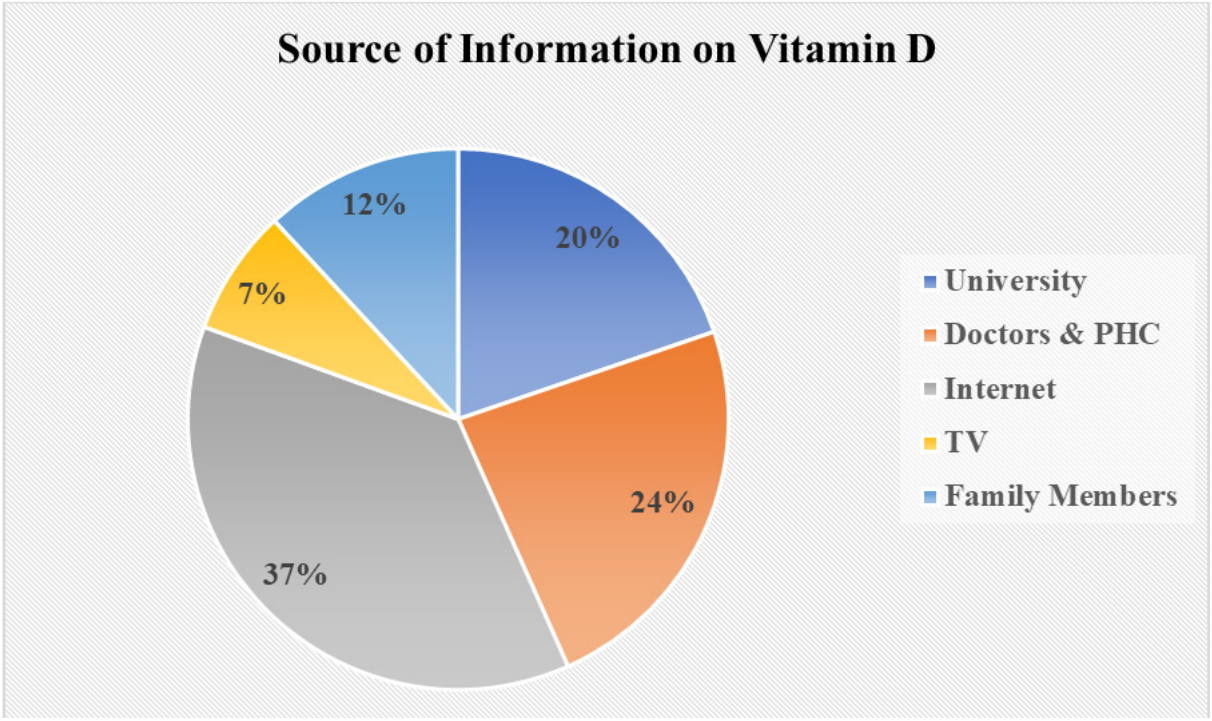

Figure 1. Sources of information about Vitamin D among respondents (N=1,011)

Knowledge about vitamin D

Table 1 shows the knowledge questions about vitamin D, 72.8% correctly recognized sun exposure as the best source for vitamin D, 63.1% answered that vitamin D can be from fish, and 42.3% from fortified cereals. Only 27.8% recognized that red meat can give vitamin D and 64.1% said that dietary sources are not enough to get the required dosage of vitamin D. Around 93% answered that vitamin D is beneficial for bones and only 47.8% recognized the lowest acceptable level of vitamin D in blood should be 30 ng/ml. The best season to get vitamin D from the sun is from March to September and this was answered correctly by 50.9%.

Table 1. Knowledge about Vitamin D (N=1,011)

Variables	Frequency	%
Best source for vitamin D		
Sun exposure	736	72.8
Vitamin D supplements	159	15.7
Food	116	11.5
Can get vit D from fish		
No	111	11.0
Yes	638	63.1
I do not know	262	25.9
Can get vit D from egg		
No	80	7.9
Yes	662	65.5
I do not know	269	26.6
Can get vit D from fortified cereals		
No	191	18.9
Yes	428	42.3
I do not know	392	38.8
Can get vit D from red meat		
No	355	35.1
Yes	281	27.8
I do not know	375	37.1
Can get vit D from chicken		
No	322	31.8
Yes	251	24.8
I do not know	438	43.3
Dietary sources are enough to get vit D		
No	648	64.1
Yes	249	24.6
I do not know	114	11.3
Season can affect vit D absorption		
No	206	20.4
Yes	805	79.6
Skin pigmentation can affect vit D absorption		
No	382	37.8
Yes	629	62.2
Sun block can affect vit D absorption		
No	555	54.9
Yes	456	45.1
Day time can affect vit D absorption		
No	143	14.1
Yes	868	85.9
Pollution can affect vit D absorption		
No	309	30.6
Yes	702	69.4
Clouds can affect vit D absorption		
No	419	41.4
Yes	592	58.6
Vitamin D can benefit bones		
No	71	7.0
Yes	940	93.0
Vit D can prevent osteoporosis		
No	97	9.6
yes	914	90.4
Lowest vit D value should be		
20 ng/ml	294	29.1
25 ng/ml	234	23.1
30 ng/ml	483	47.8
Best time to get vit D		
All months	340	33.6
Winter	156	15.4
March to September	515	50.9

Those with good level of knowledge about vitamin D comprised 74.3% while poor level of knowledge was 25.7% as shown in Figure 2.

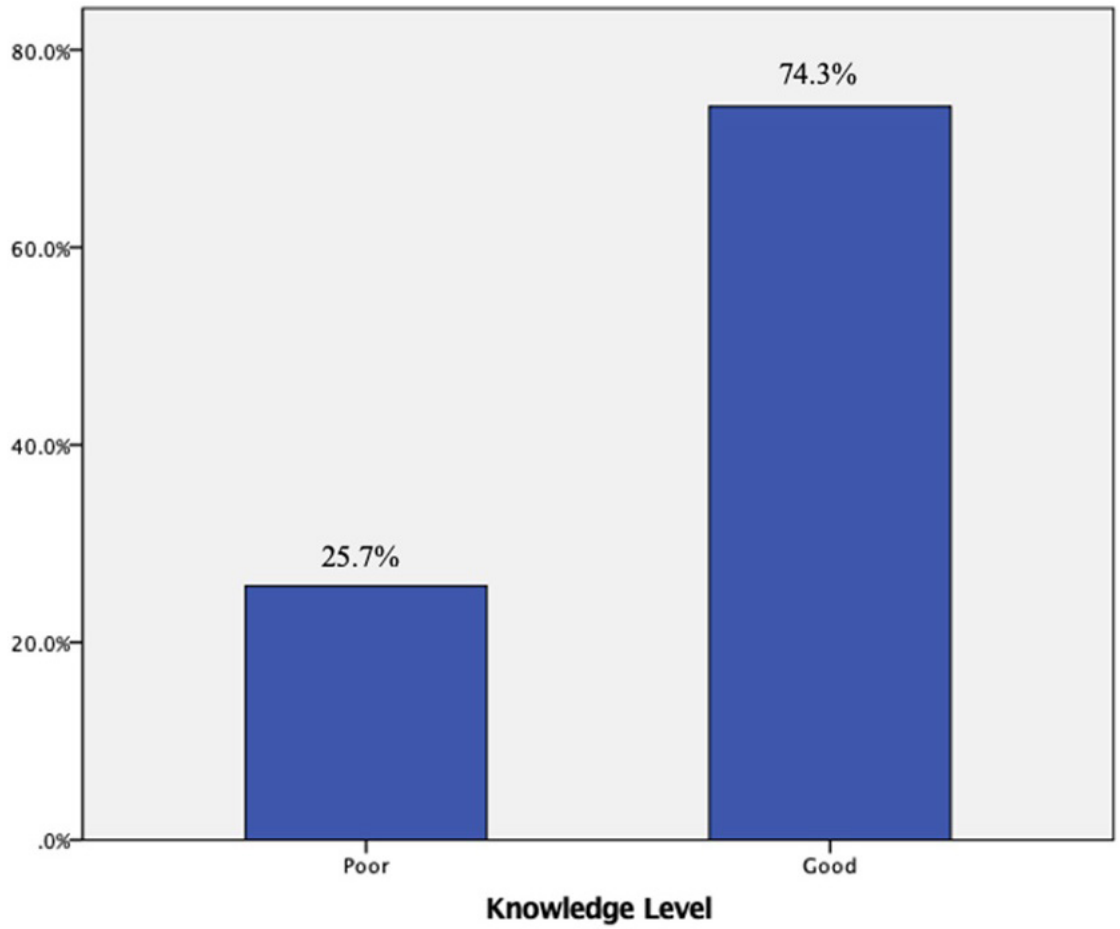

Figure 2. Knowledge level among respondents

Association between sociodemographic variables and knowledge level

Table 2 shows the association between sociodemographic variables and knowledge level.

There was a significant association between knowledge level with gender, (P=0.001), educational level, (P<0.001), occupation, (P=0.029) and marital status, (P<0.001).

Table 2. Association between sociodemographic variables and knowledge level

Variables	Poor knowledge		Good Knowledge		X^2	*P*-value
	N	%	N	%		
Gender					12.045	**0.001**
Male	83	20.0	332	80.0		
Female	177	29.7	419	70.3		
Educational level						**<0.001**
Read & write		53.3	14	46.7	15.708	
Primary school	64	21.1	240	78.9		
University	180	26.6	497	73.4		
Occupation						**0.029**
Unemployed	152	29.2	369	70.8	7.058	
Government	66	23.0	221	77.0		
Private sector	42	20.7	161	79.3		
Marital status						**<0.001**
Married	57	21.1	212	78.8	19.1*	
Single	189	26.3	529	73.3		
Divorce	14	66.7	7	33.3		
Widow	0	0	3	100.0		

*Fisher exact test was performed

Association between doing blood test, taking supplements and knowledge level

As indicated by Table 3, there was a strong association between knowledge level and having previously performed blood tests for vitamin D, (P=0.001) and taking supplements, (P<0.001).

Table 3. Association between Chronic diseases, Vitamin D Variables, and Knowledge Level

Variables	Poor knowledge		Good Knowledge		X^2	*P*-value
	N	%	N	%		
Chronic diseases					0.235	0.628
No	203	25.4	597	74.6		
Yes	57	27.0	154	73.0		
Vit D blood test before						**0.001**
No	155	29.9	363	70.1	9.835	
Yes	105	21.3	388	78.7		
Do you take vitamin D supplements?						**<0.001**
No	175	32.7	360	67.3	29.089	
Yes	85	17.9	391	82.1		

Regression analysis was done and gender (P<0.001) and taking vitamin D supplements (P<0.001) showed a significant association with knowledge level. After adjusting for confounders, respondents who take vitamin D supplements are 2.241 more times to have better knowledge as shown in Table 4

Table 4. Regression analysis for the knowledge level with the selected demographic variables

	Univariate logistic regression model		Multivariable logistic regression model	
Gender	**COR (95%CI)**	***P* Value**	**AOR (95%CI)**	***P* Value**
Male (Ref)	1.00		1.00	
Female	0.592 (0.439-0.797)	0.001	0.467 (0.335-0.649)	**<0.001**
Educational level				
Do not read &. Write	0.317 (0.152-0.662)	0.002	0.439 (0.198-0.970)	**0.042**
Secondary school	1.358 (0.982-1.878)	0.064	1.580 (1.100-2.270)	**0.013**
University degree (Ref)	1.00		1.00	
Marital status				
Not married	0.714 (0.511-0.997)	0.048	1.081 (0.728-1.604)	0.701
Married (Ref)	1.00		1.00	
Working status				
Not working	0.686 (0.516-0.913)	0.010	0.749 (0.527- 1.604)	0.107
Working (Ref)	1.00		1.00	
Having chronic diseases				
No (Ref)	1.00		1.00	
Yes	1.089 (0.772-1.534)	0.628	0.773 (0.533-1.119)	0.172
Did blood test before				
No (Ref)	1.00		1.00	
Yes	0.634 (0.476-0.844)	0.002	1.303 (0.923-1.839)	0.133
Taking vit D supplements				
No (Ref)	1.00		1.00	
Yes	0.447 (0.333-0.601)	<0.001	2.241 (1.701-3.444)	**<0.001**

Discussion

The main aim of the current study was to find out the knowledge level regarding vitamin D among general population in Baghdad city. The main finding was that 74.3% of the respondents had good knowledge about vitamin D. Vitamin D deficiency is a common health problem among populations in different countries. So, to decrease the burden of this problem, it is important to plan for educational programs directed to those with limited or low levels of knowledge about it.[16]

Nearly half of the sample had done vitamin D test checking before. This result is lightly similar to the Saudi Arabian study whereby 54.4% of the people mentioned doing the test during the COVID-19 pandemic in 2020.[17] However, the result is higher than what was found in previous recently published articles. In the United Kingdom (UK), vitamin D testing increased from 0.29 per 1000 person-year in 2005 to reach 16.1 per 1000 person-year in 2015.[18] In Switzerland, vitamin D level was tested in 14% of the study population in 2015 and increased to 20% in 2018. Testing increased by 69% for individuals aged 26–30.[19] There was a significant and obvious increase in the rate of people testing for vitamin D levels in recent years, may be due to increasing population concern and awareness about vitamin D deficiency. It also may be related to increased prescribing of vitamin D supplements. Even though, excessive intake of vitamin D may lead to toxicity and hypercalcemia which may cause symptoms like muscle pain and weakness, nausea and vomiting, excessive urination, and feeling thirsty; and finally, dehydration, kidney stones, and even renal failure.[20] Around half of the participants in this study mentioned taking supplements of vitamin D. Only 19% of Egyptian mothers were found to use vitamin D supplements at the time of data collection in a study published in 2020.[21] While only 32% of Emirati students consumed vitamin D supplements despite their high knowledge level.[22]The high percentage of the sample who used to intake vitamin D supplements in this study may be due to a higher knowledge level about this vitamin. It is found that most of the sample had a good level of knowledge regarding this vitamin. This result was much higher than what was found in Saudi Arabian healthcare educators who reported good knowledge scores among 45% of them. [23] Adequate knowledge about vitamin D was demonstrated in 69.5% of Al-Baha city people from Saudi Arabia in 2020.[24] Even though Pakistani university students had contact with the internet, their knowledge about vitamin D was relatively insignificant. [25]

The main source of knowledge about vitamin D in this study was the internet followed by doctors and primary health care centers (PHCCs). Although information provided by media may not be a reliable source of health information, people still rely on the internet as a source of information about vitamin D. There was an increase in web searches about vitamin D from 2004 to 2010 indicating the raising of scientific attention. After 2010, people searched for the phrase 'vitamin D" on Google it showed seasonal variation reaching its maximum searching in February 2016.[26] In England, the internet was the source of population knowledge about vitamin D.[14] Most of the health educators (64%) from the Kingdom of Saudi Arabia (KSA) depended on doctors for knowledge about vitamin D.[23] Doctors were the main source of knowledge about vitamin D in (46%) of Egyptian mothers.[21]

The majority of the sample recognized sun as the main source of vitamin D for the human body followed by supplements and then food. In another study, health educators recognized sun exposure (49.4%) in the first degree followed by food (30.3%) and then supplements (26.8%). Most of the health educators (70%) knew that fish can be a source of vitamin D.[23]

Premenopausal women from Jeddah in KSA found that 72.8% recognized sun exposure as a main source of vitamin D, 27.8% recognized red meat, and 64.1% said that diet is not enough to give the needed vitamin D to bodies.[27] Among mothers from Cairo, milk and its product were recognized by 67.3%, egg yolk by 61.5%, and oily fish by 52.9%.[21] In this study, eggs and fish were mostly recognized by the participants as dietary sources for vitamin D. Slightly less than half of the sample mentioned fortified cereals, and nearly a third recognized red meat while less than one-quarter knew that chicken can provide the body with vitamin D. Around one-quarter agreed that food is enough to supply the body with its need of vitamin D. Even a lot of types of diet may contain vitamin D, it is found that diet is still not enough for human body to reach its recommended levels of vitamin D. Fortified food and supplement must be suggested for this purpose. For adults, it is recommended to take at least 37.5 to 50 mcg (1,500–2,000 IU)/day of supplemental vitamin D to maintain serum 25(OH)D levels above 75 nmol/L (30 ng/mL).[20]

Even though sun exposure is an important natural source of vitamin D, many factors may lead to interaction with the absorption of vitamin D like season, time of day, length of day, cloud cover, smog, skin melanin content, and sunscreen.[28] In this study, participants recognized different factors that affect the absorption of vitamin D. The majority identified the daytime and the season of the year as factors affecting vitamin D absorption in the body. Previous studies found that winter and spring are seasons when vitamin D concentration appears to be lower when compared to other seasons, and this is strongly related to sunlight incidence.[29, 30] It was found that exposure to sunlight at hours from 10.00 to 14.00 during the day led to higher vitamin D production when compared to other hours.[31] Even though, excessive exposure to sunlight at special times throughout the day may increase the risk of skin cancer and the appearance of early wrinkles.[32]

Half of the sample was aware that the best season to get vitamin D from the sun is from March to September because in other months the sunlight is not strong enough to supply bodies with the required vitamin D. The mechanism by which vitamin D is made in the body is by the interaction of sunlight with skin cholesterol. The ultraviolet B rays hit cholesterol in the skin and provide energy for the synthesis process.[33]

Most of the population in this study answered that vitamin D is beneficial for bones which was slightly similar to the result presented in a previous study in which 94.4% of Indian medical students were aware of the benefit of vitamin D for bone health.[34] In another study 80.3% of the Saudi population knew that vitamin D is essential for bone health. [35] It was found that vitamin D is essential for bone health and its deficiency may lead to many diseases like osteoporosis.[36] The effect of vitamin D in the prevention of osteoporosis was detected by 81.6 % of Jordanian adult people and 78% of them thought that its deficiency may lead to pain in bones and joints.[37] Among Libyan medical students, 72.2% mentioned that vitamin D is important for bone health.[38] Vitamin D is a very important vitamin for bones, it helps the absorption of calcium and its deficiency in children may cause rickets with obvious bone symptoms. Less than half of the participants recognized the lowest acceptable level of vitamin D in blood should be 30 ng/ml. In a study conducted in India, there was 77.7% of the sample knew the normal acceptable range of vitamin D in blood [39] while only 38.6% of the Saudi population were aware of the normal levels of vitamin D. So, about 63% of Saudi population complained from vitamin D deficiency.[35]

Population knowledge about vitamin D is found to be associated with different sociodemographic variables namely being male, educated, employed, and married were significantly related to good knowledge levels about vitamin D in the current study. Among the Saudi population, females, the married, and students were the more knowledgeable groups.[35]

The people who used to check their vitamin D levels and take vitamin D supplementations were more related to good knowledge levels about vitamin D. People need to practice healthy behaviour by increasing their knowledge about related health issues. As a result, they will experience more protective and prevention practices.[40] Even though, a study conducted on Malay females, found no significant association between knowledge about vitamin D and their practice ($r = 0.08$, $p = 0.355$).[12] People with lower knowledge about vitamin D were found to have lower intake of supplements and finally suffer from vitamin D deficiency.[8] Another study found that Pakistani students who checked their vitamin D regularly were more likely to use vitamin D supplements than those who never checked and this was more likely among female students.[25]

Some limitations were detected in this study. The first was doing it in only one province which is located in the middle of Iraq. So, it is recommended to make a comparison between different provinces with different latitudes. The second is that it is an internet-based study, so, there was low representation of those who could not read and write. More concentration on the practice is needed for future research as this study did not address in detail.

Conclusion

The study has found that two-thirds of the respondents (74.3%) had good knowledge about vitamin D. Gender, educational level and taking vitamin D supplements were the factors associated with knowledge about vitamin D. The study also found that many respondents were unaware of factors that can affect vitamin D absorption, such as season, skin pigmentation, sunblock, daytime, pollution, and clouds. We recommend that more education and awareness about vitamin D and its sources, as well as the factors that can affect its absorption should be delivered through social or other media. In addition, research in other Iraqi states is recommended in the future to see if there is any difference from the capital city, Baghdad.

Conflicts of interest

All authors declare no conflicts of interest

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Authors' contribution

HFG conducted the study and prepared the manuscript draft, TMJT contributed to study design, data collection and entry TNH data analysis, and results writing. All authors read and approved the manuscript.

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